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Biology

First stage

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Connective tissue

Connective tissue

is the most abundant and the most widely distributed of the tissues. Connective tissues perform a variety of functions including support and protection. All connective tissue consists of three main components: fibers, ground substance and cells.

General characteristics of connective tissue:

1 .Fills the spaces between organs and tissues in most of the body..

2. intercellular matrix separating the cells.

3.Very good blood supply.

4. Can be flexible or rigid in nature

Functions of connective tissue:

1 .Protection .

2 .Support (bone, cartilage).

3 .Binding (tendons, ligaments).

4 .Storage of fat and energy .

5 .Disease fighting (blood).

6 .Blood production.

7 .Absorb shock.

8. Immunity.

Classification of connective tissue:

1 .Connective tissue proper:

a. Loose Connective Tissue :

1 Areolar.

2Adipose .

3 Reticular .

b. Dense Connective Tissue

1 Dense regular.

2 Dense irregular.

3Elastic .

2 .Cartilage:

a Hyaline .

b Elastic .

c Fibrocartilage .

3 .Bone .

4. Blood.

Loose Connective Tissue

❖ **Areolar:**

supported epithelium and also many internal organs have cells called fibroblasts ,separated by jellylike matrix containing collagen fibers and yellow elastic fibers ,macrophages cell , mast cells, and somewhite blood cells.

found in lungs and urinary bladder allows these organs to expand.

.**Function**: It forms a protective, Wraps and cushions organs. such as muscles , blood vessels and nerves ; its macrophages phagocytize bacteria; plays important role in inflammation; holds and conveys tissue fluid.

❖ **Adipose:**

the cytoplasm is a thin layer and the nucleus is found in the edge of the cell.

There are 2 types adipocytes by the color of the tissue:

a) White adipocytes(Ex. Thick skin)

b) Brown adipocytes (Ex. Kidney)

❖ **reticular**:

Network of reticular fibers in a typical loose ground substance

Function: Fibers form a soft internal skeleton that supports other cell including white blood cells mast cells ,macrophage.

Location: Lymphoid organs (lymph nodes, bone marrow, and spleen).

- **Dense connective tissue:**

1- dense regular

contains many collagen fibers , major cell type is the fibroblast are arranged in a parallel bundles

Function: Attaches muscles to bones or to muscles; attaches bones to bones

2- dense irregular

irregularly arranged collagen ,fibers; some elastic fibers major cell type is the fibroblast . Able to withstand tension exerted in many directions

provides structural strength Found in organs and of joints dermis of the skin; submucosa of digestive tract. not arranged in parallel bundles.

3 -dense elastic

containing a high proportion of elastic fibers . Allows recoil of tissue following stretching; **found in** Walls of large arteries ligaments associated with the vertebral column; within the walls of the bronchial tubes.

- **Cartilage**

Cartilage: is one of the types of connective tissue consisting of:

1 .Chondrocytes: cartilage cells produce the matrix.

2 .Lacunae: pocket that chondrocyte sits in it.

3 .Matrix: produced by Chondrocytes and contains fibers.

Types of cartilage:

1 .Hyaline cartilage

2 .Elastic cartilage

3 .Fibrocartilage .

Cartilage is located in: nose, ear, trachea, bronchi, ends of the ribs ,

and joints

1 .Hyaline cartilage:

It is the weakest types of cartilage, the chondrocytes and lacunaeare seen clearly.

Location: Trachea, ribs and nose

2. Elastic cartilage: Elastic cartilage provides strength, and elasticity, and maintains the shape.

Location: outer ear, epiglottis and Eustachian tube.

3. Fibrocartilage:

It is the strongest type of cartilage, because it has combination of

hyaline cartilage and thick layers of dense regular connective

tissue.

Location: intervertebral disc

- **Bone**

Bone tissue: is the major structural and supportive connective tissue of the body.

Cells of bone tissue:

1 .Osteoblasts synthesize the bone matrix and are responsible for its mineralization .

2 .Osteocytes are inactive osteoblasts that have become trapped within the bone they have formed.

3. Osteoclasts break down bone matrix through phagocytosis.

Types of Bone:

- Compact bone: this is the area of bone to which ligaments and tendons attach. it is thick and dense.
- spongy bone: it is soft, Located in the bone marrow

- **Blood**

Blood tissue: is a connective tissue that works to defense to the body. The blood contains:

1 (Red blood cells (RBCs): (erythrocytes) lack of nucleus and organelles in human and mammals.

2 (White blood cells (WBCs): (leukocytes) have nucleus and organelles.

There types are:

1.Neutrophil,

2.Basophil,

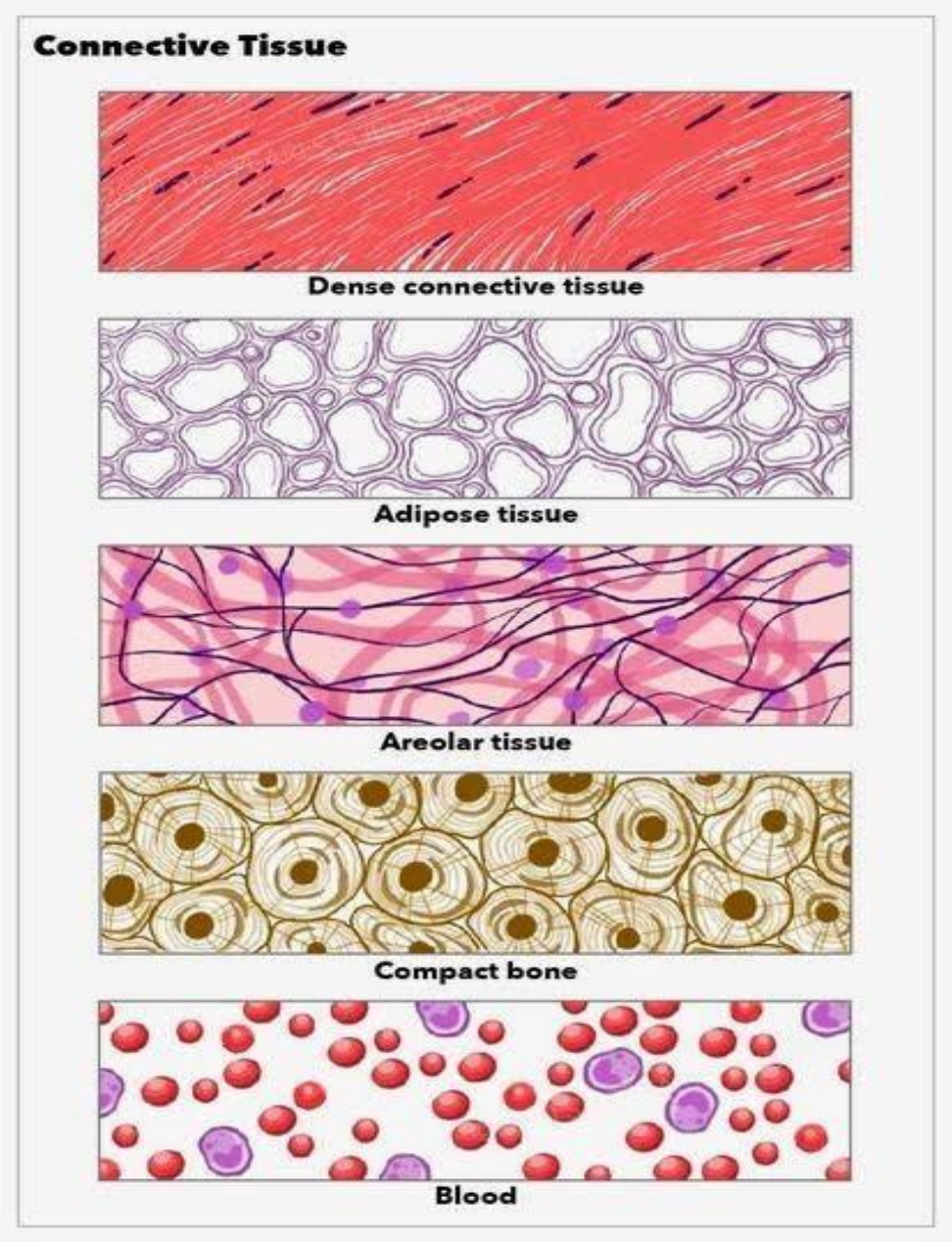
3.Eosinophil ,

4.Monocyte,

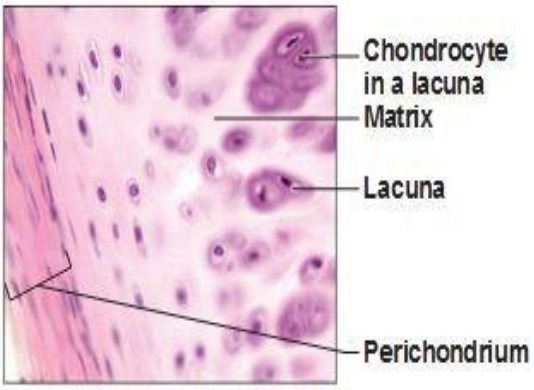
5.lymphocyte.

3 Platelets: (thrombocytes) are responsible for blood clotting Coagulation.

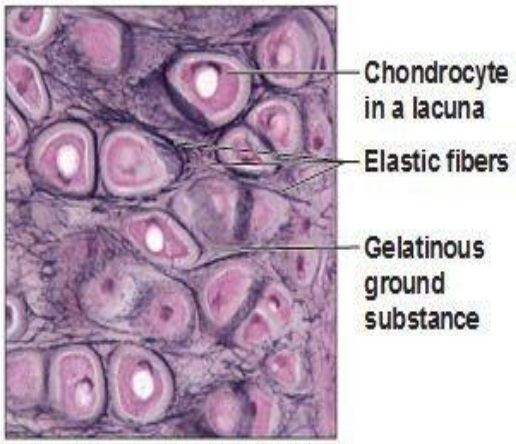
4 Plasma: a blood fluid.


Connective Tissue
Dense connective tissue
Adipose tissue
Areolar tissue
Compact bone
Blood

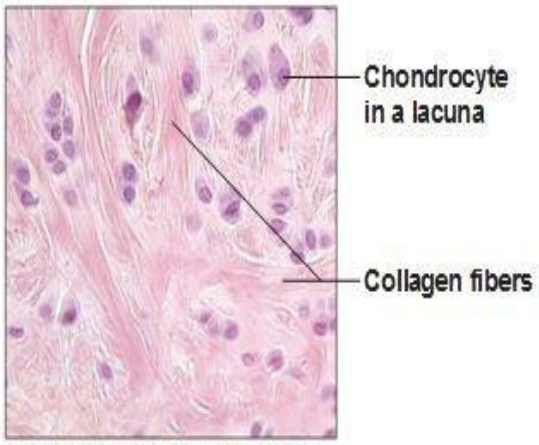
Cartilages in the Adult Body



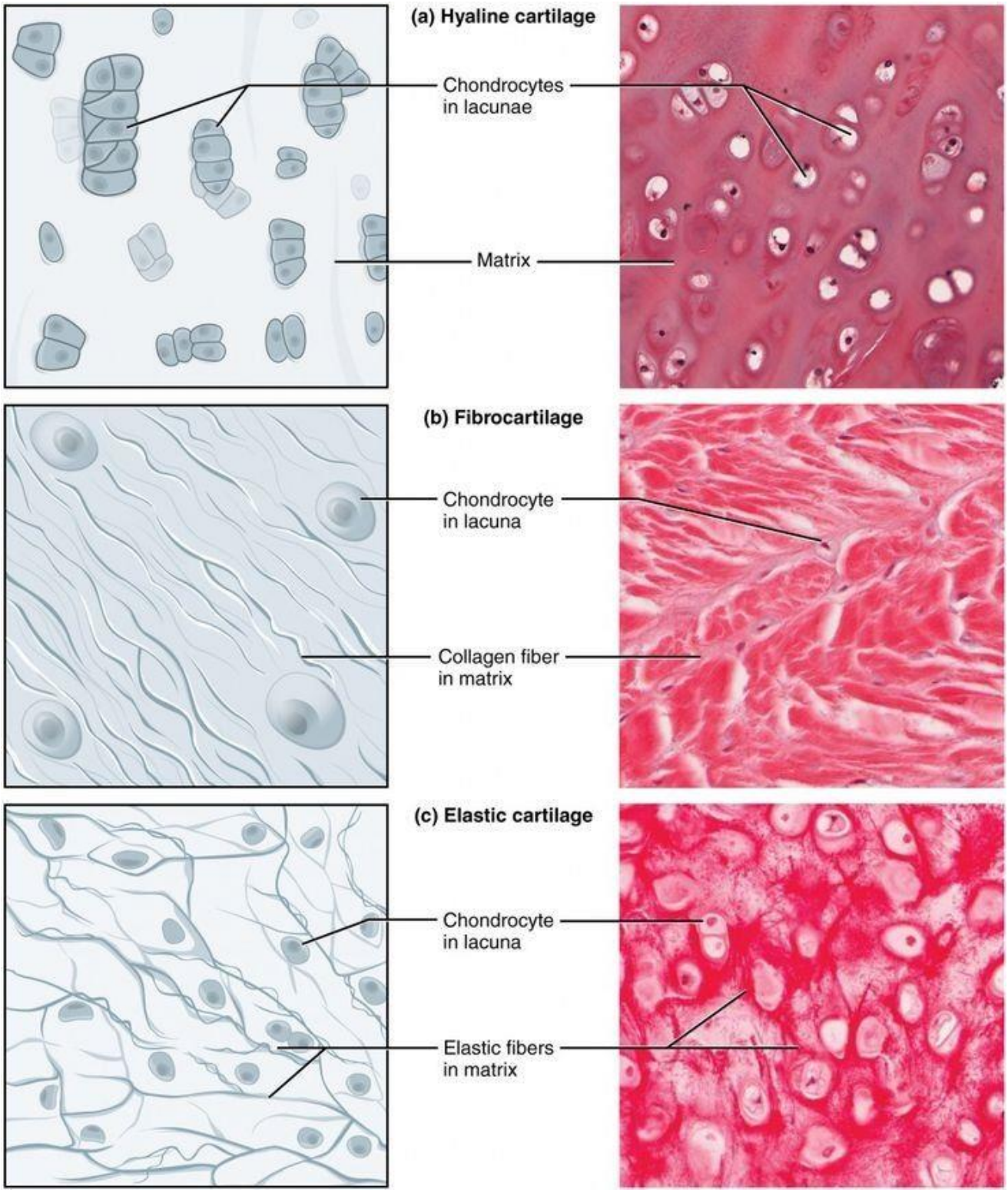
(a) Hyaline cartilage (180×)



(b) Elastic cartilage (470×)



(c) Fibrocartilage (285×)


(a) Hyaline cartilage
Chondrocytes in lacunae
Matrix
(b) Fibrocartilage
Chondrocyte in lacuna
Collagen fiber in matrix
(c) Elastic cartilage
Chondrocyte in lacuna
Elastic fibers in matrix